

Banking Economics

Lecture 6

The importance of banking intermediation

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Outline, Goals, and Main Bibliography

► Outline:

2. The importance of banking intermediation

2.1. Financial decision-making and the contribution of banking intermediation to economic agents' welfare.

2.2. The economic justifications for the existence of banks.

► Goals:

Formalize, using an intertemporal resource allocation model, the contribution of financial intermediation to the well-being of economic agents.

Identify the reasons that economic theory provides for the existence of financial intermediaries in general, and banks in particular, and recognize the contribution of banks to the proper functioning of the economy.

► Main Bibliography:

Matthews, K., & Thompson, J. (2005). *The Economics of Banking* (3rd ed.). John Wiley & Sons. (Chapter 2)

2.1. Financial decision-making and the contribution of banking intermediation to economic agents' welfare

- ▶ The main problem of financial decision boils down to the question of how to allocate economic resources intertemporally.

The decisions depend on:

- a) The individual subjective preferences between present and future consumption;
- b) The investment opportunity set;
- c) The relationship between return and risk of each investment opportunity.

This last dimension is excluded under certainty.

2.1. Financial decision-making and the contribution of banking intermediation to economic agents' welfare (cont.)

- ▶ The model developed in this chapter analyzes consumption decisions and their interaction with real (productive) and financial investment decisions in a setting where the decision-maker, or economic agent, seeks to maximize their intertemporal utility.
- ▶ Since the economic agent decides how to allocate resources optimally between consumption, real investment and financial investment over a two-period time frame, the model is referred to as a model of intertemporal resource allocation.

Assumptions of the model

- ▶ All information is known with certainty;
- ▶ Markets are perfect, with no transaction costs, taxes, or other frictions;
- ▶ The model considers only two time periods (1 and 2).

Consumption and Utility Function

- ▶ The economic agent's objective is to maximize their intertemporal utility, which depends only on consumption (C). Taking into account one time period (time period 1), the utility function $U(C_1)$ is represented graphically.

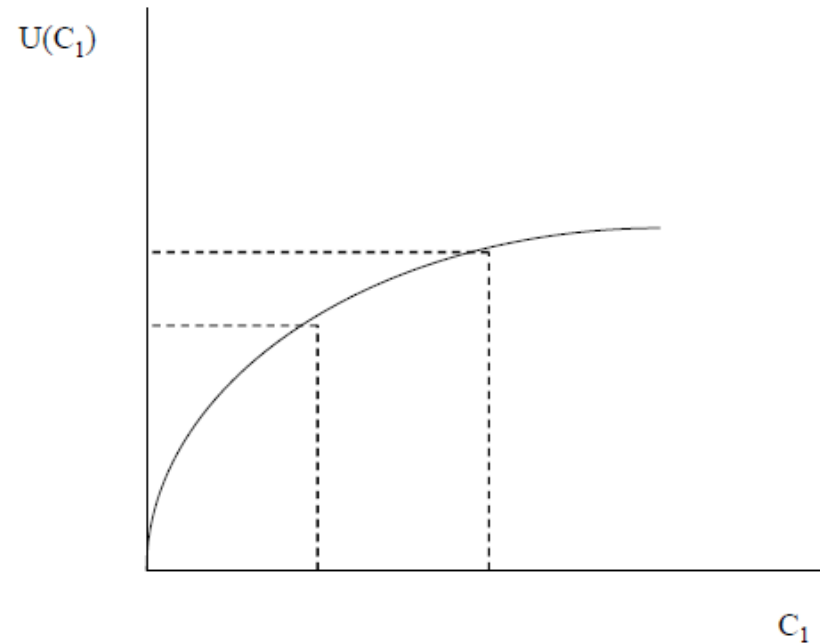


Figure 1. Instantaneous utility function for period 1

- ▶ The instantaneous utility function is **concave** as **marginal utility** is **positive and decreasing**.

Indifference Curve Map

- ▶ Considering 2 periods, and knowing that the economic agent's intertemporal utility function depends on the consumption of both periods, $U(C_1, C_2)$, the indifference curve map takes the following form:

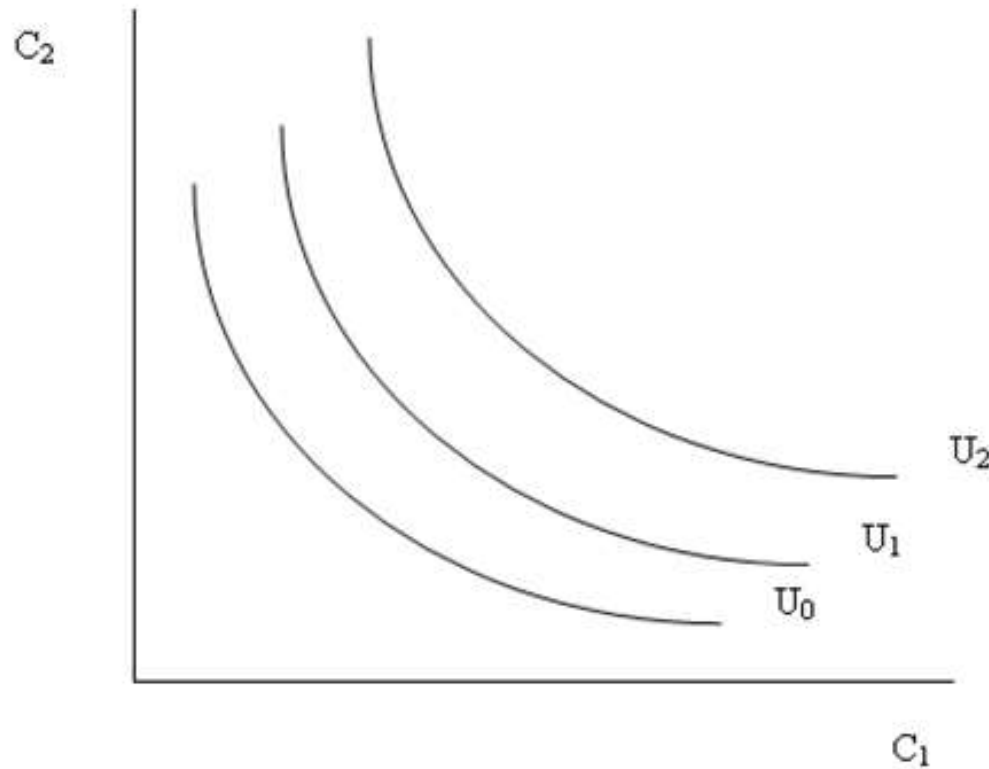


Figure 2. Indifference Curve Map

Indifference Curve Map (cont.)

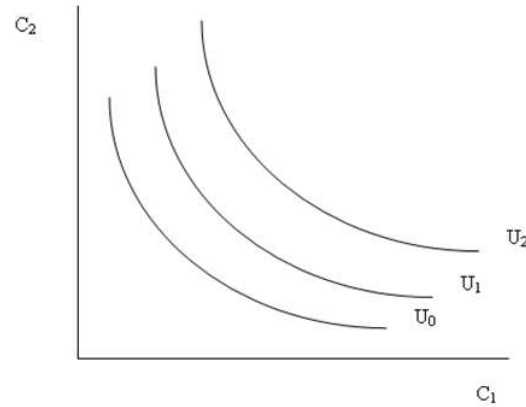


Figure 2. Indifference Curve Map

- ▶ The indifference curve U_0 represents **all combinations of consumption** in period 1 and period 2 (C_1, C_2) that provide the economic agent with the **same level of satisfaction**.
- ▶ The curve has a **negative slope**: if consumption in one period increases, consumption in the other period must decrease for the level of satisfaction to remain **unchanged**. This follows from the **non-satiation principle**, i.e., the fact that **marginal utility is positive**.
- ▶ The indifference curve U_0 is **convex to the origin**: successive, equal increases in consumption in a given period translate into progressively smaller increases in utility. This is the **convexity axiom**, which reflects the principle of **diminishing marginal utility**.
- ▶ Indifference curves are **dense in space** and **do not intersect**. In this case, $U_0 < U_1 < U_2$.
- ▶ The slope of the tangent at a point on the indifference curve gives the **subjective intertemporal rate of preference for consumption**.

2.1. Financial decision-making and the contribution of banking intermediation to economic agents' welfare (cont.)

Bearing in mind the **properties** of both the **intertemporal** and **instantaneous utility functions**, we will consider **four different cases**:

- 1) **Case 1: No investments are made** (neither real nor financial), and the economic agent must spend all of their resources on consumption;
- 2) **Case 2: Consumption and real investment coexist**, and the economic agent must maximize their intertemporal utility by selecting the optimal combination of consumption and real investment in each period;
- 3) **Case 3: Consumption and financial investment coexist**, and the economic agent must maximize their intertemporal utility by selecting the optimal combination of consumption and financial investment (or indebtedness) in each period.
- 4) **Case 4: Consumption, real investment, and financial investment coexist**, and the economic agent must maximize their intertemporal utility by selecting the optimal combination of consumption, real investment, and financial investment in each period.

Case 1: No investments are made

If the economic agent has an **exogenous endowment of wealth Y_1 in period 1**:

- ▶ It can consume the amount $C_1 = Y_1$ in **period 1** and **zero** in **period 2**;
- ▶ It can consume **zero** in **period 1**, save, and consume $C_2 = Y_1$ in **period 2**;
- ▶ It can consume $C_1 < Y_1$ in **period 1** and $C_2 = Y_1 - C_1$ in the following period;

Note that the economic agent can save part of their initial endowment in period 1, but **without a financial system or financial intermediaries**, the **only transfer of funds is from the present to the future** and never in the opposite direction.

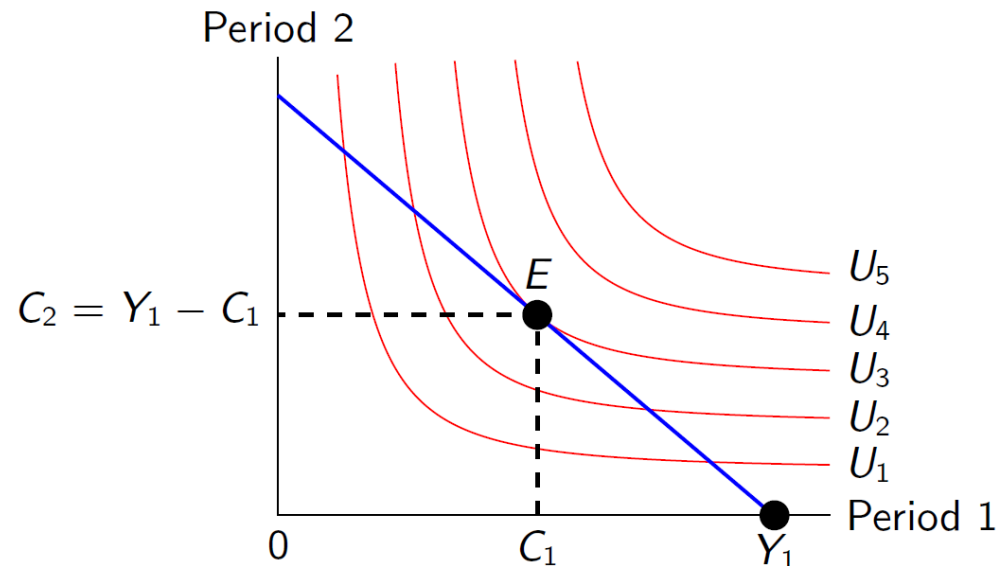


Figure 3. Maximization of intertemporal utility

Case 2: Consumption and real investment coexist

Now, we consider the possibility of the economic agent allocating a share of their endowment Y_1 to **productive investment**. Since there is no exogenous endowment of wealth in period 2 ($Y_2 = 0$), the economic agent maximizes their intertemporal utility by adopting the following strategies:

- ▶ In period 1, the economic agent consumes a portion of their endowment and invests the remaining amount in productive activities;
- ▶ In period 2, the economic agent consumes the returns generated from their **productive investment**, as they have no exogenous endowment.

The properties of the utility functions remain unchanged relative to Case 1. However, we must now consider the **properties of real investment**. It is reasonable to assume that **productive investment** follows the law of **diminishing returns to scale**, which states that the **marginal profitability** of the investment is **positive but decreasing**.

$$\frac{\partial Result}{\partial Investement} > 0, \text{ but } \frac{\partial^2 Result}{\partial Investement^2} < 0$$

Case 2: Consumption and real investment coexist (cont.)

- Given the **properties of productive investment**, it can be represented as a **concave curve** called **Production-Possibility frontier**.

The economic agent chooses the **combination of consumption** at point **E** that **maximizes their intertemporal utility**.

Year 1:

Endowment: Y_1

Productive investment: $Y_1 - C_1$

Consumption: C_1

Year 2:

Consumption: C_2 = earnings from the productive investment

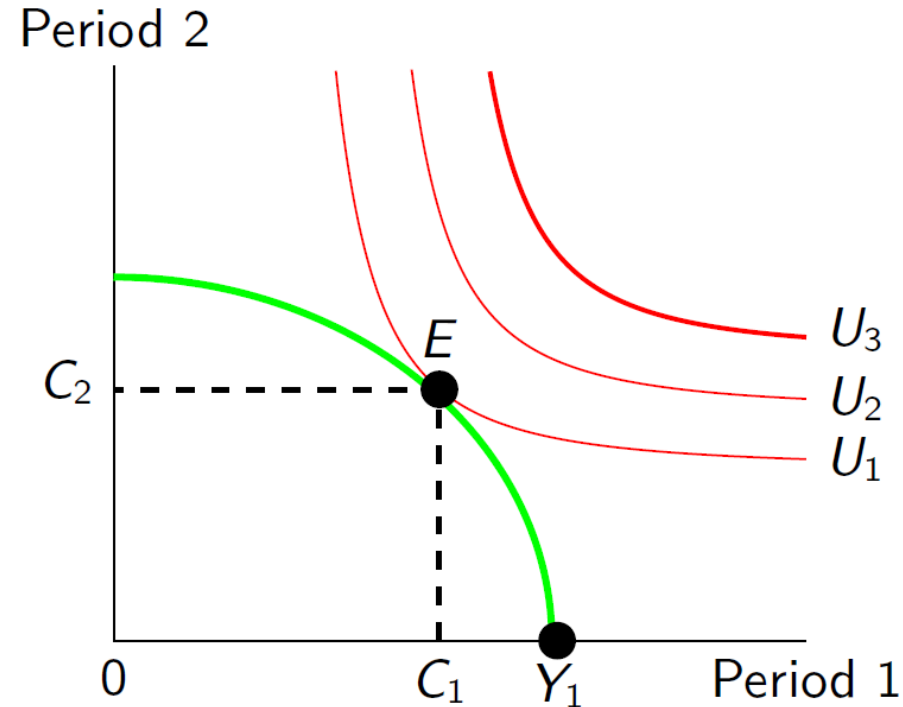


Figure 4. Maximization of intertemporal utility with a Production-Possibility frontier

Case 3: Consumption and financial investment coexist

- ▶ Now, disregard productive investment and assume the presence of a financial market where economic agents can either lend (apply funds) or borrow funds. Financial investment may take negative values, representing situations where the agent takes on a loan.
- ▶ The financial market acts as an intermediary, facilitating these transactions.
- ▶ The price of funds is the interest rate r , which is both unique and known.
- ▶ Furthermore, assume that there are no costs associated with financial transactions conducted in this market.
- ▶ The economic agent has exogenous wealth endowments Y_1 and Y_2 .
- ▶ The financial market can be represented by a straight line, referred to as the budget constraint, the financial market line, or the line of financial investment opportunities.
- ▶ The novelty of this case lies in the ability to transfer future resources into the present, made possible by the existence of a financial market.

Case 3: Consumption and financial investment coexist (cont.)

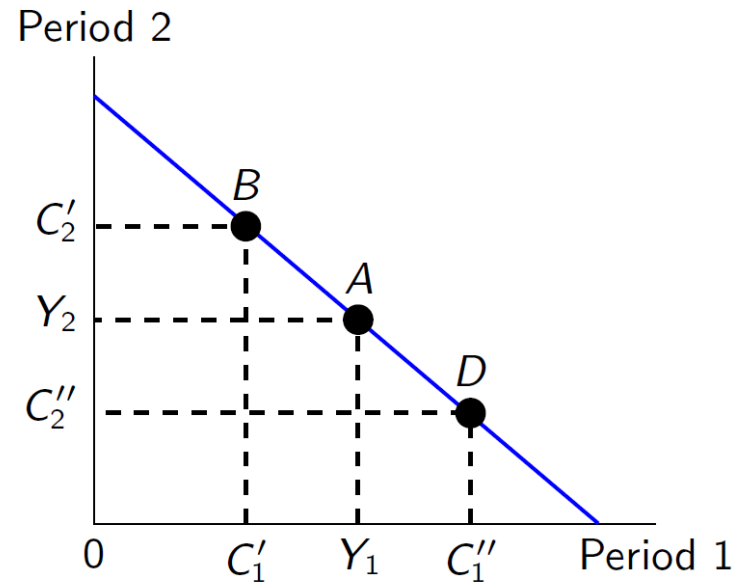


Figure 5. The financial market line

► **Point A:** No financial market investment

$$C_1 = Y_1, C_2 = Y_2$$

► **Point B:** Saves and applies funds in the market

$$C_1' < Y_1, \quad \text{Saves} = Y_1 - C_1', \quad C_2' = Y_2 + (Y_1 - C_1')(1 + r)$$

► **Point D:** Borrows in the market

$$C_1'' > Y_1, \quad \text{Borrows} = C_1'' - Y_1, \quad C_2'' = Y_2 - (C_1'' - Y_1)(1 + r)$$

Case 3: Consumption and financial investment coexist (cont.)

The **financial market line** represents the **constraint** the economic agent faces in their **consumption choices** and depends only on the **market interest rate**. The **combination of consumption levels** chosen by the agent will depend on their **subjective preferences**.

Algebraically, the economic agent's **optimization problem** can be represented as follows:

- ▶ **Maximize** $U(C_1, C_2)$ **subject** to the **constraint** posed by the **financial market**, which is $C_2 = Y_2 + (Y_1 - C_1)(1 + r)$.
- ▶ The **budget constraint** can be rewritten by dividing both sides of the equation by $(1 + r)$:

$$C_1 + \frac{C_2}{(1 + r)} = Y_1 + \frac{Y_2}{(1 + r)}$$

- ▶ The economic interpretation of this equation is that **the sum of the present values of consumption** must be equal to **the sum of the present values of income**.

Case 3: Consumption and financial investment coexist (cont.)

- In reality, the rates at which funds are borrowed differ from the rates at which funds are invested ($r_b > r_s$). In that case, the **financial market line** would be represented by a broken line.

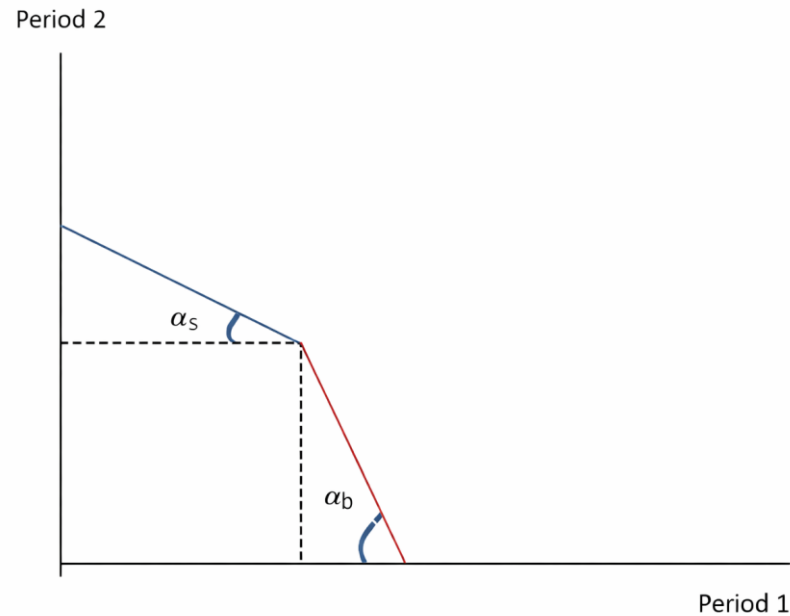


Figure 6. Financial market line with different rates

Case 4: Consumption, real investment, and financial investment coexist

- ▶ Now, we will analyze the **complete version** of our model: the economic agent's **consumption choice** with **both productive and financial investment**.
- ▶ There is a **threefold** decision, the economic agent must decide:
 - 1) How much to invest in **real assets (productive investment)**?
 - 2) How much to **consume**?
 - 3) What **position** to take in the **financial market** and by **how much**?

It is useful to consider **two** distinct scenarios:

- a) One where the economic agent has a **preference for future consumption** over present consumption;
- b) And the opposite case, where **present consumption** is **preferred**.

Case 4.a): Economic agent with a preference for future consumption

In period 1:

- Initial wealth endowment is Y_1
- Consumption: $C_1 < Y_1$
- Productive investment: $Y_1 - a_1$
- Funds invested in the financial market: $a_1 - C_1$

In period 2:

- Consumption:

$C_2 = \text{return from productive investment } (= a_2) + \text{return from financial investment } (= C_1 - a_1)$

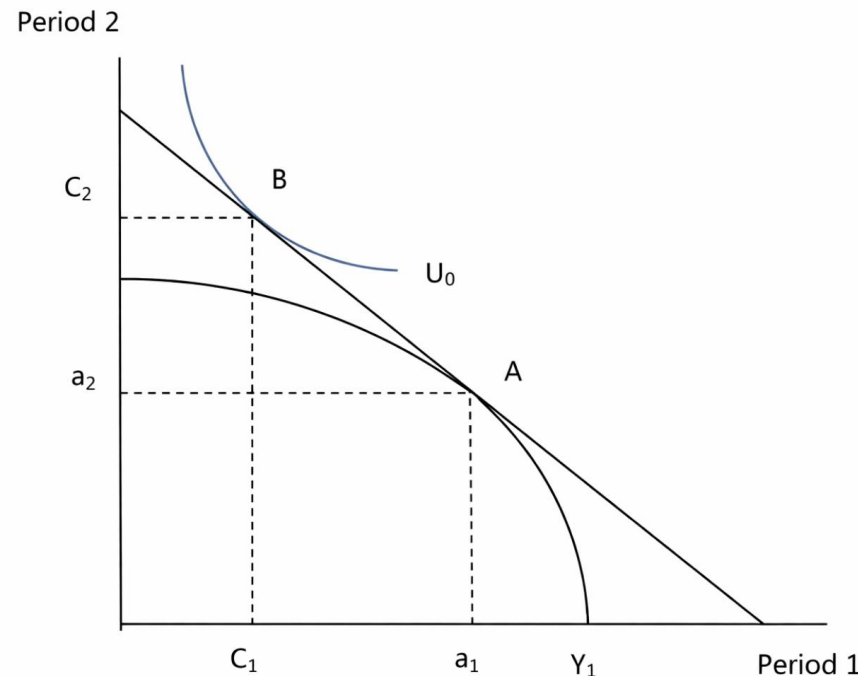


Figure 7. Choice of an economic agent with a preference for future consumption

Case 4.a): Economic agent with a preference for future consumption (cont.)

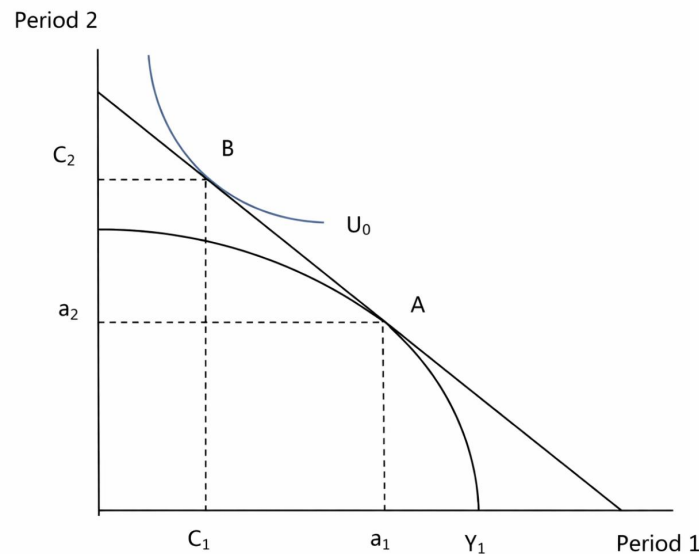


Figure 7. Choice of an economic agent with a preference for future consumption

Two remarks about the previous analysis:

- ▶ The level of **productive investment** will be such that its **marginal rate of return** equals the **financial market interest rate**.
- ▶ The **existence of a financial market** implies an **increase in welfare** for the **economic agent**. If there were no financial market, the agent's consumption choices would be **limited by the production-possibilities frontier**, and the **level of satisfaction** they could achieve would be **lower than U_0** .

Case 4.b.1): Economic agent with a preference for present consumption

In period 1:

- Initial wealth endowment is Y_1
- Consumption: $C_1 > Y_1$
- Productive investment: $Y_1 - a_1$
- Funds borrowed in the financial market: $C_1 - a_1$

In period 2:

- Consumption:
 $C_2 = \text{return from productive investment } (= a_2) - \text{loan repayment } (= a_2 - C_2)$

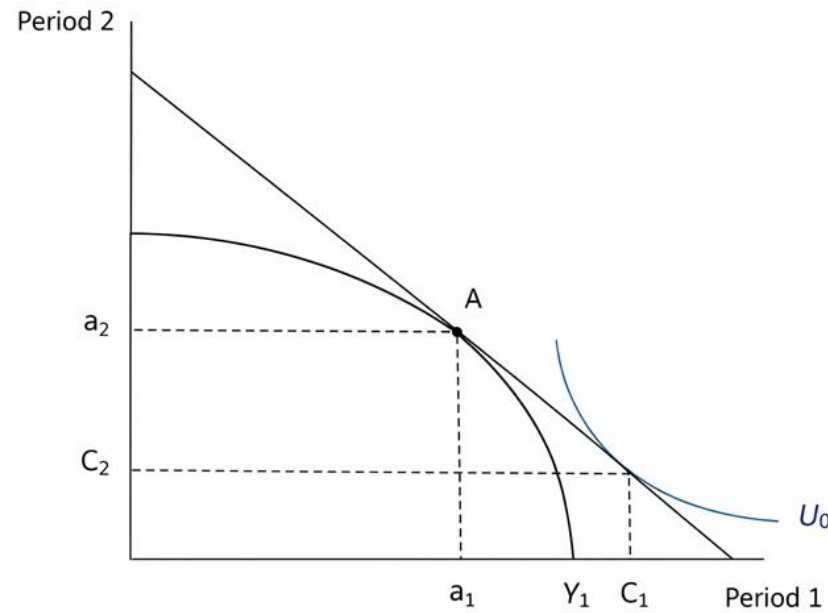


Figure 8. Choice of an economic agent with a preference for present consumption

Case 4.b.2): Economic agent with a preference for present consumption

In period 1:

- Initial wealth endowment is Y_1
- Consumption: $C_1 < Y_1$ but $> a_1$
- Productive investment: $Y_1 - a_1$
- Funds borrowed in the financial market: $C_1 - a_1$

In period 2:

- Consumption:
 $C_2 = \text{return from productive investment } (= a_2) - \text{loan repayment } (= a_2 - C_2)$

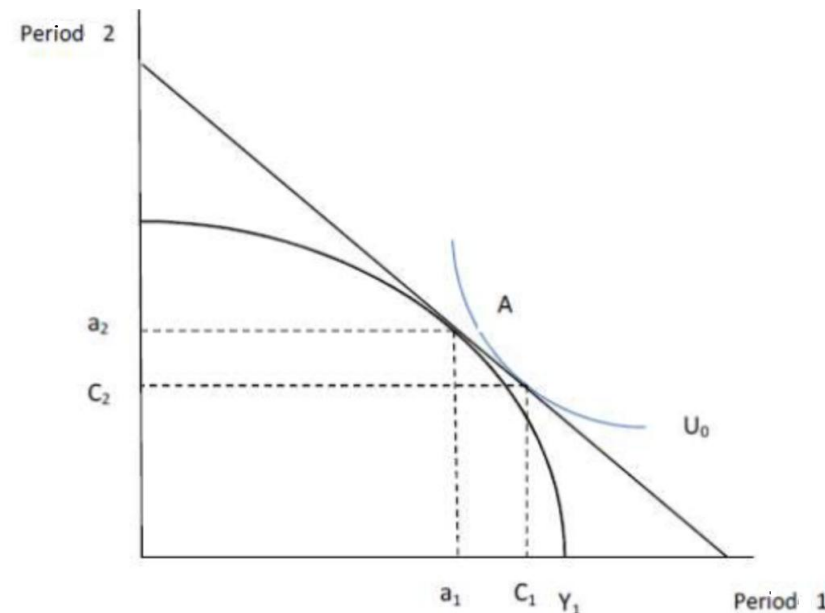


Figure 9. Another case of a choice of an economic agent with a preference for present consumption

Fisher Separation Theorem

- ▶ Underlying our analysis is one theorem:

Fisher Separation Theorem: Consumers make their investment and intertemporal consumption choices separately when they are price takers. They first choose productive investment to maximize wealth and then they choose their position in the financial market and make intertemporal consumption choices to maximize utility.

Thus, in our model:

- ▶ First, the economic agent chooses productive investment such that its marginal rate of return equals the financial market interest rate.
- ▶ Second, the choice of financial investment (borrowing or investing funds), as well as the balance between present and future consumption, depends primarily on individual preferences (represented by indifference curves).